

Pneumatic Cylinder Actuators

Series B1C

Installation, Maintenance and
Operating Instructions

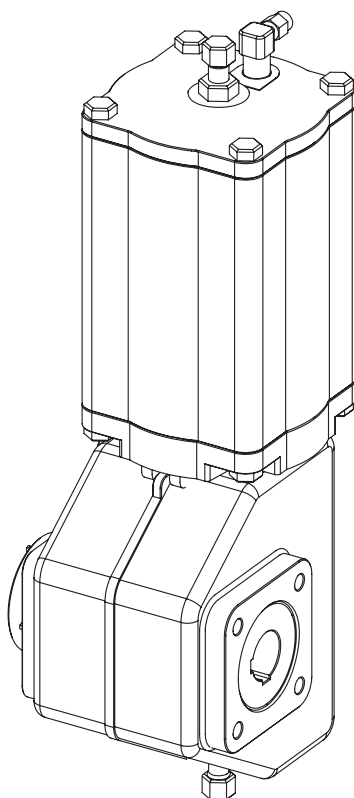


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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the actuator.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

Addresses and phone numbers are printed on the back cover.

SAVE THESE INSTRUCTIONS!

Subject to change without notice.

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1 GENERAL

1.1 Scope of the manual

These instructions provide essential information for the use of Metso B1C series actuators. For more details about valves, positioners and accessories, refer to the separate installation, operating and maintenance instructions of the particular unit.

1.2 Structure and operation

The B1C series actuators are pneumatic cylinder actuators designed for control and shut-off service.

The linkage has PTFE, PE-HD and Glacier DU bearings. The robust cast-iron housing efficiently protects the mechanism from ambient dust and moisture.

The mounting face dimensions of the B1C actuator comply with the ISO 5211 standard.

The linkage converts the linear motion of the piston into rotation by the actuator shaft. The actuator generates maximum torque when for example a ball or butterfly valve is closed, and the need for torque is greatest. Another peak is achieved at 60-80°, when the need for torque on a butterfly valve caused by the dynamic forces of for example pipe flows reaches a maximum.

Screws are located in the upper end of the cylinder and in the lower end of the housing to regulate the length of the piston stroke and also the rotation angle of the actuator shaft.

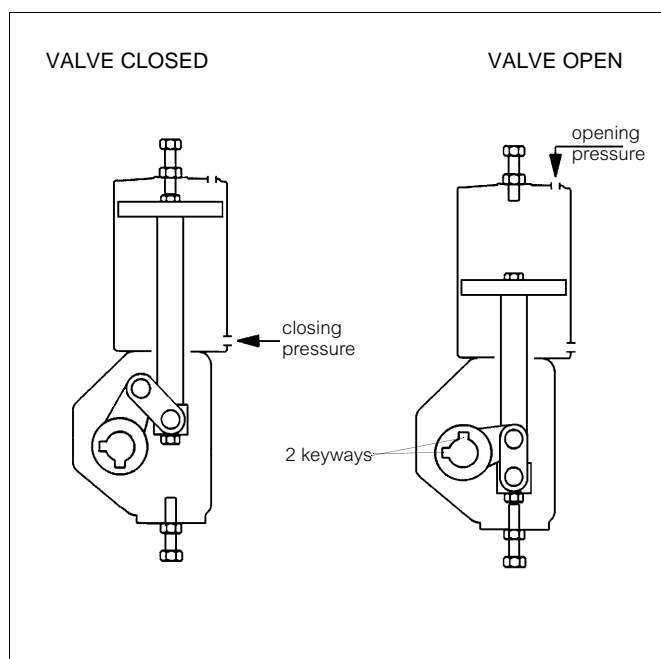


Fig. 1 Operating principle of the actuator

1.3 Actuator markings

The actuator is provided with an identification plate, see Fig. 2. Identification plate markings are:

1. Type
2. Manufacturing site, date, successive no. (bar code)
3. SO number or ID number (bar code)
4. Checked by
5. Max. supply pressure

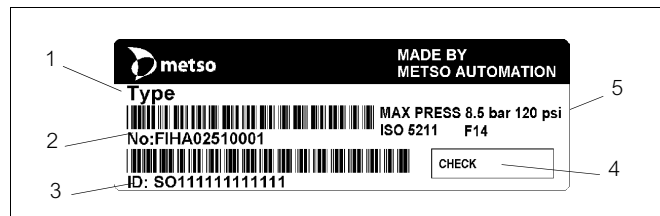


Fig. 2 ID plate.

1.4 Specifications

Operating temperature:

standard structure	-20° to 70 °C / -4° to 160 °F
low temperature structure	-40° to 70 °C / -40° to 160 °F
high temperature structure	-20° to +120 °C / -4° to 250 °F

Max. supply pressure:

B1C 6...17, 60, 602	8.5 bar / 120 psi
B1C 20...50, 502	10 bar / 145 psi
B1C 75, 752	5 bar / 70 psi

Stroke volume, dm³ / in³

B1C 6	0.33 / 20
B1C 9	0.60 / 37
B1C 11	1.10 / 67
B1C 13	2.30 / 140
B1C 17	4.30 / 262
B1C 20	5.40 / 329
B1C 25	10.50 / 640
B1C 32	21 / 1280
B1C 40	43 / 2620
B1C 50	84 / 5130
B1C 60	121 / 7380
B1C 75	189 / 11500
B1C 502	195 / 11900
B1C 602	282 / 17200
B1C752	441 / 26900

Nominal torque, Nm / lbf ft (at max. supply pressure):

B1C 6	135/100
B1C 9	260/190
B1C 11	480/355
B1C 13	1000/740
B1C 17	1900/1400
B1C 20	2700/2000
B1C 25	5300/3910
B1C 32	11000/8115
B1C 40	22000/16225
B1C 50	43000/31715
B1C 60	62000/45730
B1C 75	48000/35400
B1C 502	100000/73755
B1C 602	122000/89980
B1C 752	113000/83350

NB. The torque changes according to supply pressure.

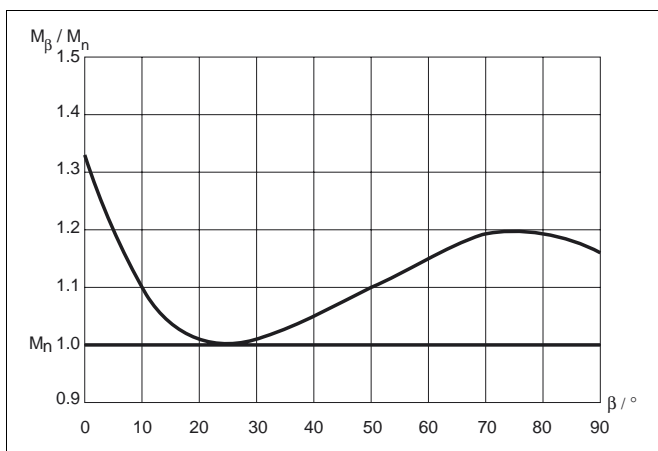


Fig. 3 Output torque as a function of turning angle

1.5 Recycling and disposal

Most actuator parts can be recycled if sorted according to material. Most parts have material marking. A material list is supplied with the actuator. In addition, separate recycling and disposal instructions are available from the manufacturer. An actuator can also be returned to the manufacturer for recycling and disposal against a fee.

1.6 Safety precautions

CAUTION:

Don't exceed the permitted values!

Exceeding the permitted pressure value marked on the actuator may cause damage and lead to uncontrolled pressure release in the worst case. Damage to the equipment and personal injury may result.

CAUTION:

Don't dismantle a pressurized actuator!

Dismantling a pressurized actuator leads to uncontrolled pressure release. Shut off the supply pressure and release pressure from the cylinder before dismantling the actuator. Otherwise, personal injury and damage to equipment may result.

CAUTION:

Beware of the cutting movement of the valve!

Hands, other parts of the body, tools or other objects must not be pushed into the valve's flow port while it is open. Also prevent foreign objects from entering the pipes. The valves function like a cutter while operating. Shut off and detach the supply of compressed air to the actuator during maintenance. Otherwise, personal injury or damage to the equipment may result.

CAUTION:

Don't use the lever in the torsion arm for manual operation when the actuator is pressurized!

Shut off the supply pressure and release pressure from the cylinder before using the hand lever. Note also the dynamic torque caused by the pipe flow. Otherwise, personal injury and damage to equipment may result.

CAUTION:

Don't leave the lever in the torsion arm after manual operation!

Leaving the lever in the torsion arm can cause personal injury or damage to the equipment.

CAUTION:

Take the weight of the actuator or valve combination into account when handling it!

Do not lift the valve combination from the actuator, positioner, limit switch or their piping. Lift the actuator as directed in Section 2, lifting ropes for a valve combination should be fastened around it. The weights are shown in Section 9. Dropping may result in personal injury or damage to the equipment.

2 TRANSPORTATION, RECEPTION AND STORAGE

Check the actuator and the accompanying devices for any damage that may have occurred during transport. Store the actuator carefully before installation, preferably indoors in a dry place. Do not take the actuator to the intended location and do not remove protection plugs from the pipe connections until the actuator is installed.

Lift the actuator according to Figure 4:

Horizontally from the stop screws, vertically from a lifting eyebolt which has been fitted instead of the stop screw. Do not use eye-bolts for double cylinder actuators. See Section 9 for weights.

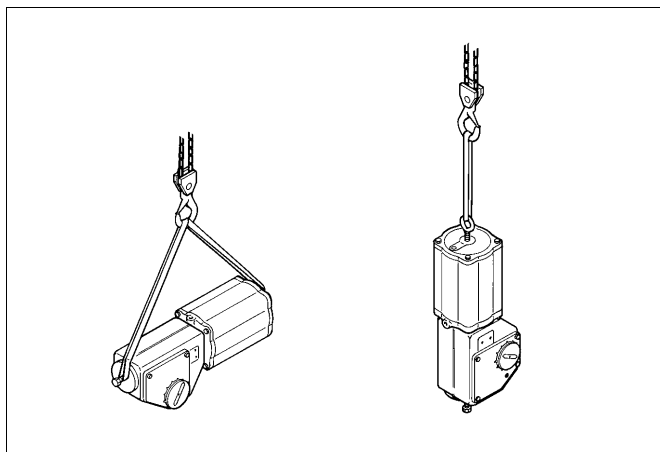


Fig. 4 Lifting the actuator

3 MOUNTING AND DEMOUNTING

3.1 Actuator gas supply

Dry compressed air or natural gas can be used in double-acting cylinder actuators; an oil spray is not needed. Clean, dry and oil-free compressed air must be used in cylinder actuators equipped with a positioner. The air inlets are shown in the dimensional drawing in Section 9. The maximum permitted supply pressure is indicated on the identification plate. See also Section 1.4.

3.2 Mounting the actuator on the valve

CAUTION:

Take the weight of the actuator or valve combination into account when handling it!

CAUTION:

Beware of the cutting movement of the valve!

The actuator is installed directly into the shaft bore of the valve. If the shaft bore is larger than the shaft diameter, a bushing is used. There are two key slots in the shaft bore of the actuator; the angle between them is 90°. They permit changes in the installation position of the actuator with respect to the valve. Metso valves have a bevel at the end of their shafts to facilitate installation.

The installation position can be chosen freely, although Metso recommends one in which the cylinder is vertical. This is the best way to protect the actuator from impurities

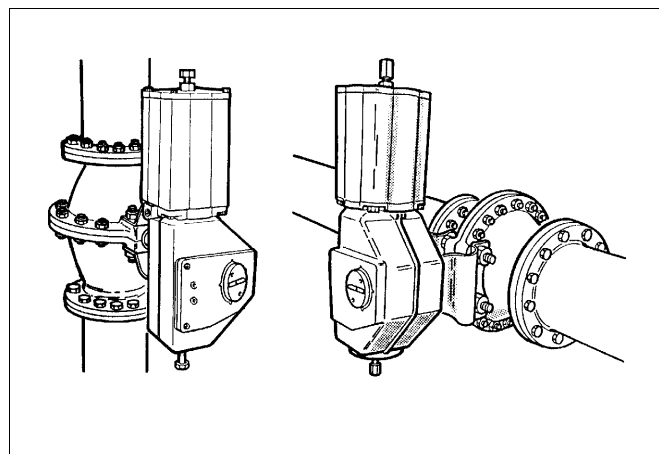


Fig. 5 Ways to install the actuator

in the supply air or damage caused by water.

When you change the position of the actuator make certain the indicator arrow has been turned to a position corresponding to that of the valve.

The shaft bore and the bushing can be lubricated before mounting with anti-corrosive, for example Cortec VCI 369, to prevent them from rusting together.

The actuator must not touch the pipeline, because pipeline vibration may damage it or interfere with its operation.

In some cases, for instance when the actuator is exceptionally large, the valve has an extended stem or when there is lot of piping vibration, it may be advisable to support the actuator. Contact Metso's Automation business for more instructions.

There are two adjustable stop screws in the actuator; these stop the movement of the secondary shaft in the extreme positions. The actuator generates a torque of approximately 1.3 times the nominal torque when the piston is at the upper end of the cylinder, see also Fig. 3. For some valves, e.g. butterfly valve, the closing torque and position is accurate. The stop screw at the cylinder end has to be adjusted according to right instructions, see separate valve specific instructions for more detailed information. An O-ring (33A) is used for sealing the stop screw in the cylinder end. See also the instructions of the valve.

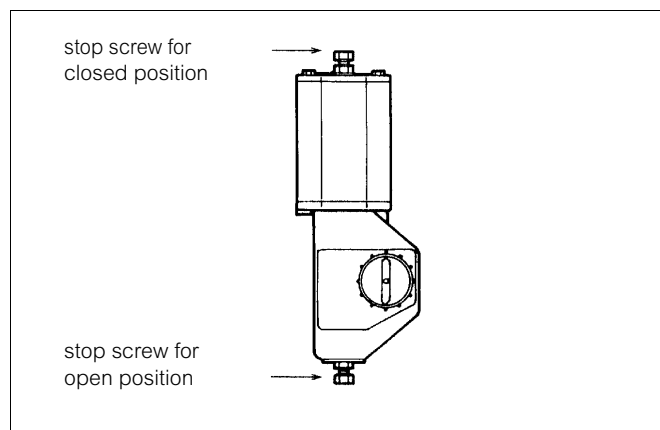


Fig. 6 The stop screws in the open and closed positions

3.3 Demounting the actuator from the valve

CAUTION:

Take the weight of the actuator or valve combination into account when handling it!

CAUTION:

Beware of the cutting movement of the valve!

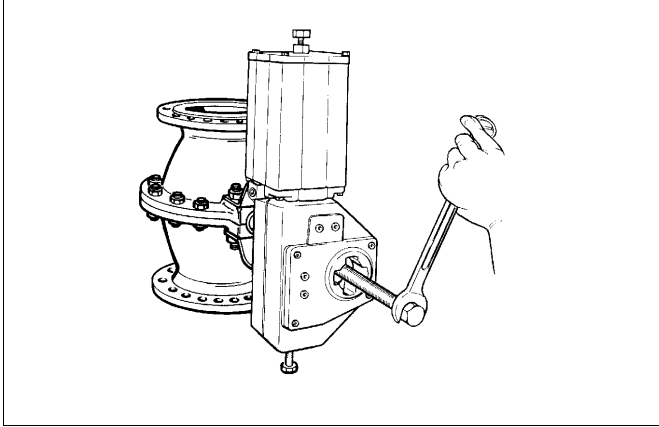


Fig. 7 Removing the actuator with the extractor

The actuator must be depressurized and the supply air pipes disconnected. Unscrew the actuator-side screws of the bracket and pull the actuator off the valve shaft. This is best done using a specific extractor, see Fig. 7 and Section 6. Note the mutual positioning of the valve and the actuator to ensure correct functioning after reassembly.

4 MAINTENANCE

4.1 General

CAUTION:

Note the precautions in Section 1.6 before beginning work!

Under normal circumstances, actuators do not require regular maintenance. Maintenance that can easily be performed by the end user is presented below.

The part numbers in the text refer to the exploded view and to the parts list in Section 8, unless otherwise stated.

Check always the condition of the pressure outlet valve (58). It may not be overpainted.

The linkage inside the housing should be lubricated at six-month intervals under severely corrosive conditions. Use for example an anti-corrosive like Cortec VCI 369. The housing can also be filled with semi-fluid water-repellant grease (for example Mobilux EP2) approximately halfway when the piston rod is in the lower position.

Adjust the limits after lubricating and greasing if you have loosened the stop screw!

4.2 Replacement of piston seals

CAUTION:

Don't dismantle a pressurized actuator!

Replacement of all seals and soft bearings is recommended when the actuator has been disassembled for maintenance.

- ☐ Operate the actuator so that the piston goes to the outermost end of the cylinder. Release the pressure from the cylinder.
- ☐ Remove the cover of the housing (2).
- ☐ Loosen the fastening screw (29) of the bearing unit and the fastening screws of the cylinder (31) from the cylinder base (6). Should the piston turn with the screw (29), remove the end of the cylinder (44) and stop the turning with the piston fastening screw (28). See Figure 8.

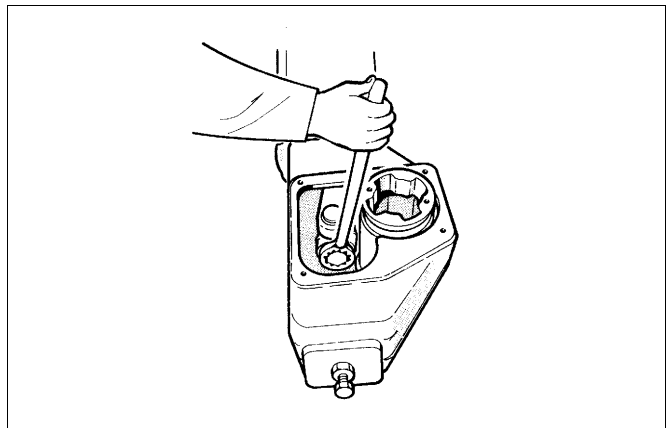


Fig. 8 Opening the fastening screw of the actuator bearing unit

- ☐ Remove the cylinder and the piston, including the rod.
- ☐ Remove the old seals and the O-ring (24, 18, 19).
- ☐ Remove the O-ring (16) and the bearing (22). Clean the seal space.
- ☐ Lubricate the seal space and the new O-ring with Unisilikon L250L or equal silicone grease. Install the new bearing and O-ring. See Figure 9.

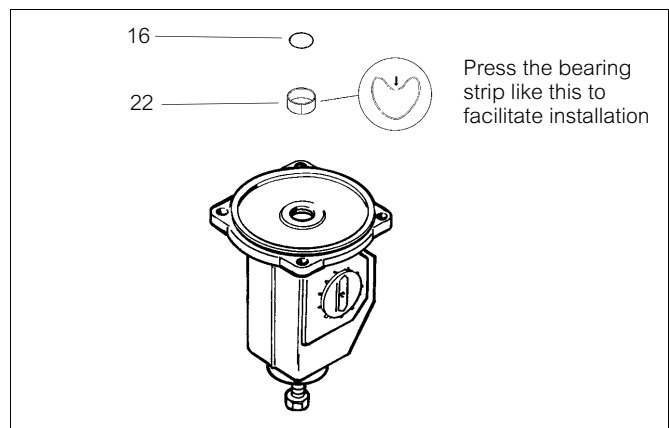


Fig. 9 Mounting the piston rod bearing and seal

- ☐ Clean the piston seal groove and lubricate with a thin layer of Cortec VCI 369.

- ❑ Place the O-ring (18) under the piston seals.
- ❑ Locate the seals (24) around the piston so that the ends of the strips come on opposite sides. Tighten the strips with the tie ring as shown in Figure 10. The strips marked with an asterisk (*) may be cut 1.5-3 mm shorter to facilitate assembly.

NOTE:

The inside surface of the cylinder must be free of any grease!

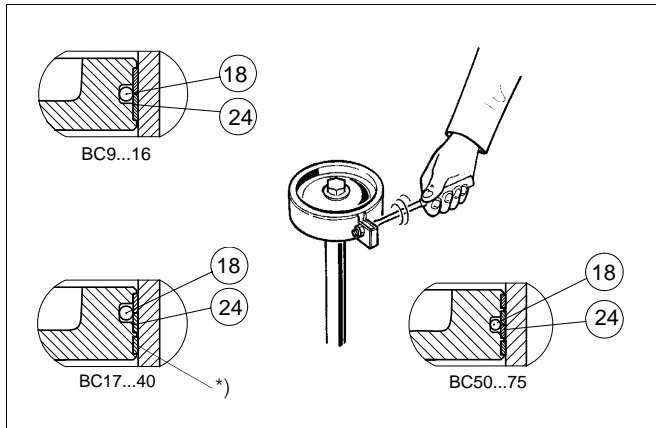


Fig. 10 Tightening piston seals with a tie ring

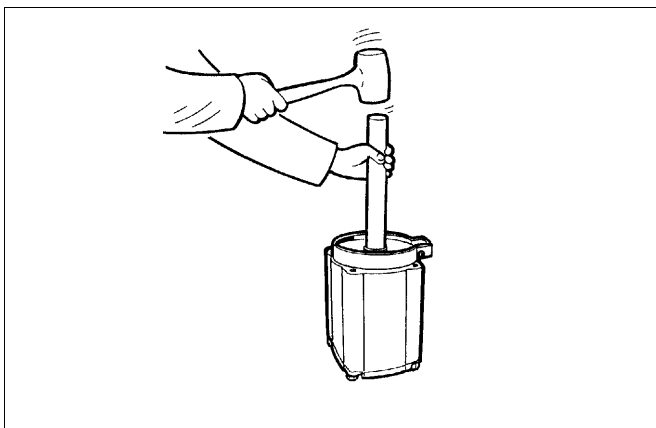


Fig. 11 Placing the piston in the cylinder

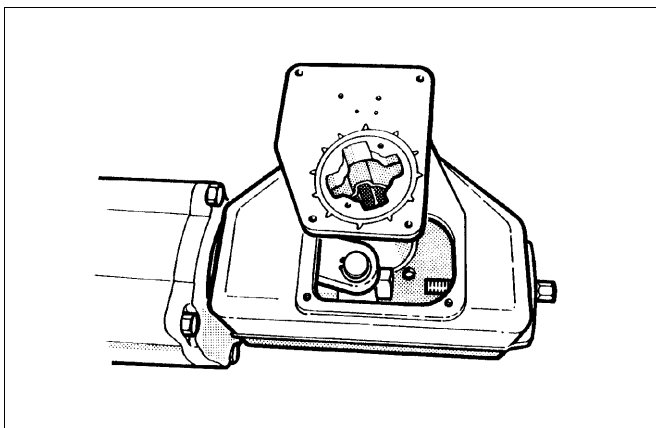


Fig. 12 Mounting the cover on the housing

- ❑ Knock or press the piston through the tie ring with a press, Fig. 11.
- ❑ Mount the O-ring (19) and the cylinder and piston. Note the location of the air inlet: use the air

inlet of the cylinder base as a guide. Tighten the screws (31). See Table 1 for torques.

- ❑ Apply locking sealant e.g. Loctite 225 to the threads of the fastening screw (29) of the bearing unit and tighten it. See Table 1 for torque.
- ❑ Fasten the housing cover temporarily so that the linkage bearings (3) function, but the linkage is still visible, Fig. 12. Note the grounding rings (3A, 4A).

CAUTION:

Keep your fingers, tools or other items out of the housing while operating the actuator with the cover open!

- ❑ Check the assembly of the cylinder to the cylinder base and end. Connect the supply air to the cylinder temporarily via a shut-off valve.
- ❑ Operate the actuator and check the function of the cylinder. Also check that the linkage bearings function properly. Remove the air supply and release pressure from the cylinder.
- ❑ Lubricate the linkage throughout with Cortec VCI 369 anti-corrosive.
- ❑ Spread the sealant (e.g. Loctite 573, with sizes B1C 40 up use silicone sealant) on the surfaces between the housing and the cover. Fasten the cover, Fig. 12. See Table 1 for torques.
- ❑ Mount the actuator to the valve and adjust the limits.

If you wish to remove the cylinder base, you will need a special tool to open the lock nut (35), see Section 6. The nut must be secured with e.g. Loctite 225 when remounted.

Table 1 Tightening torques for screws

Torque, Nm					
Item	28	29	30	31	35
Actuator					
B1C 6	35	35	12	7	
B1C 9	90	35	8	12	150
B1C 11	170	90	8	18	180
B1C 12	170	170	12	18	200
B1C 13	300	170	12	40	200
B1C 16	300	300	12	40	250
B1C 17	700	300	12	80	250
B1C 20	700	700	20	80	400
B1C 25	1100	1100	30	80	800
B1C 32	2000	2000	70	80	1500
B1C 40	2000	2000	70	200	2000
B1C 50	3400	3400	150	250	3000
B1C 60	3400	3400	150	250	3000
B1C 75	3400	3400	150	250	3000

4.3 Replacement of linkage bearings and O-rings

CAUTION:

Don't dismantle a pressurized actuator!

- ❑ Remove the actuator from the valve
- ❑ Guide the actuator so that the piston is at the outermost end of the cylinder. Release the pressure from the cylinder.
- ❑ Remove the housing cover (2).
- ❑ Loosen the fastening screw (29) of the bearing unit (5), see Figure 8.
- ❑ Turn the lever (3) so that the bearing unit is detached from the piston rod (10). Lift the entire lever system out of the housing, Figure 13.

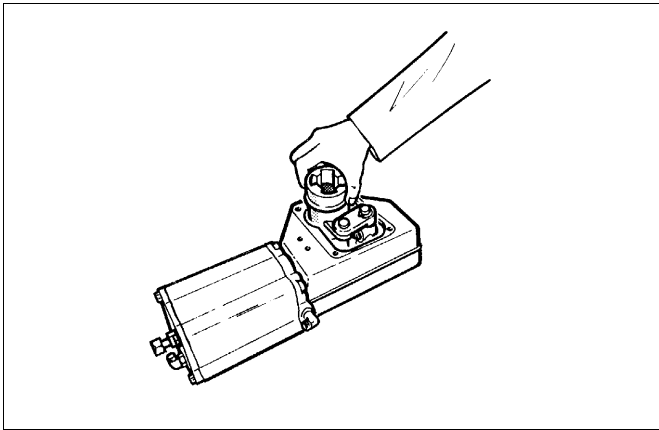


Fig. 13 Removing the linkage from the housing

- ❑ Remove the lock rings (36) and the support rings (37).
- ❑ Loosen the connection arms (4) and ring (4A), clean them and check the condition of the bearings, see Figure 14.

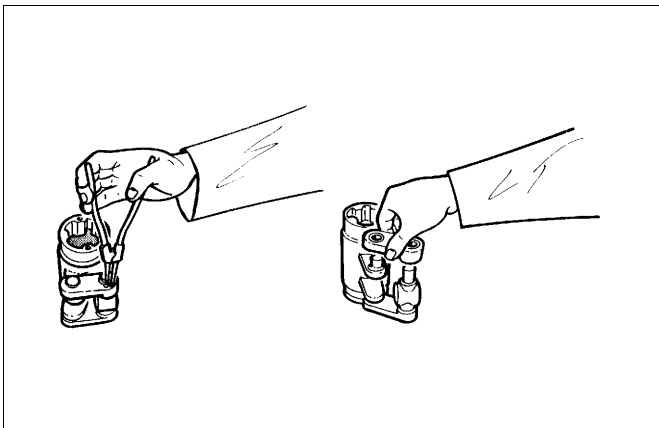


Fig. 14 Dismantling the linkage

The bearings (20, 21) of the connection arm (4) of B1C6-25 actuators are fastened with a press-on fit so that the entire connection arm assembly is replaced instead of the bearings. The bearings in actuators B1C32-75 are removable.

- ❑ Remove the lever bearings (23), the O-rings (17) and the grounding ring (3A).

- ❑ Clean the parts of the levers and lubricate the bearing and seal surfaces with Cortec VCI 369.
- ❑ Install the grounding ring (3A), the lever bearings (23) and the O-rings (17). The grounding rings (3A and 4A) are needed to meet the ATEX requirements.
- ❑ Assemble the linkage and install in the housing. See Figure 13 for the correct position. Note the ring (4A).
- ❑ Apply locking sealant e.g. Loctite 225 to the threads of the fastening screw (29) of the bearing unit and tighten it. See Table 1 for torque.
- ❑ Lubricate the levers throughout with Cortec VCI 369 anti-corrosive.
- ❑ Spread the sealant (e.g. Loctite 573, with sizes B1C 40 up use silicone sealant) on the surfaces between the housing and the cover. Fasten the cover, Fig. 12. See Table 1 for torques.
- ❑ Operate the actuator and check that it moves correctly.

Cortec VCI 369 must be applied at six-month intervals in damp conditions where corrosion is likely. Grease filling the housing should also be considered. See Section 4.1.

4.4 Maintenance of a B1CM actuator

CAUTION:

Don't use the lever in the torsion arm for manual operation when the actuator is pressurized!

CAUTION:

Don't leave the lever in the torsion arm after manual operation!

The structure of the B1CM actuator is the same, except for the manual operation lever connected with lever arm (3). See the exploded view, Section 8.

Maintenance as in Sections 4.1, 4.2 and 4.3.

4.5 Maintenance of B1C502-752 actuators

The structure of the B1C502-752 actuators is in principle the same as a normal B1C actuator. In order to ensure a high operating torque, the equipment is fitted with two cylinders connected to the secondary shaft.

For maintenance see Sections 4.1, 4.2 and 4.3.

5 MALFUNCTIONS

Table 2 lists malfunctions that might occur after prolonged use.

6 TOOLS

For maintenance of the actuator, you will need a few special tools in addition to the usual ones. The following can be ordered from the manufacturer:

- ☐ For actuator removal:
 - Extractor
- ☐ For piston seal installation:
 - Tie ring
- ☐ For cylinder base removal:
 - Lock nut key

Table 2 Possible malfunctions

Symptom	Possible cause	Action
Irregular or slow operation	Low supply pressure	Make sure that supply pressure complies with minimum torque required by valve. Check that supply air pipes are large enough.
	Positioner malfunction	Check the operation of the positioner.
	Valve malfunction	Check that valve functions properly without actuator.
	Wrong size actuator	Contact the manufacturer for checking the size.
	Leak in piston or piston rod seal	Replace seals. See Section 4.2.
	Cylinder damaged by impurities	Note installation position recommendation. Cylinder damage always requires replacement.
	Worn-out actuator bearings	Check condition of bearings in accordance with Section 4.3. Replace the bearings if necessary. If the frequency of operation is high, the bearings and piston seals should be replaced at regular intervals, max. of 500 000 operations..
	Linkage rusted in difficult damp conditions	Clean the linkage and replace the bearings. Lubricate the housing regularly and apply grease as in Section 4 .1. If water collects in the housing, bore a hole in the lower part of the housing (ø5 mm).
	The fastening screw in the bearing unit is loose	Tighten screw. Lock with Loctite 225.
	Play in the joint between actuator and valve	Replace necessary parts.

7 ORDERING SPARE PARTS

NOTE:

Use only original spare parts. This ensures proper functioning of the actuator.

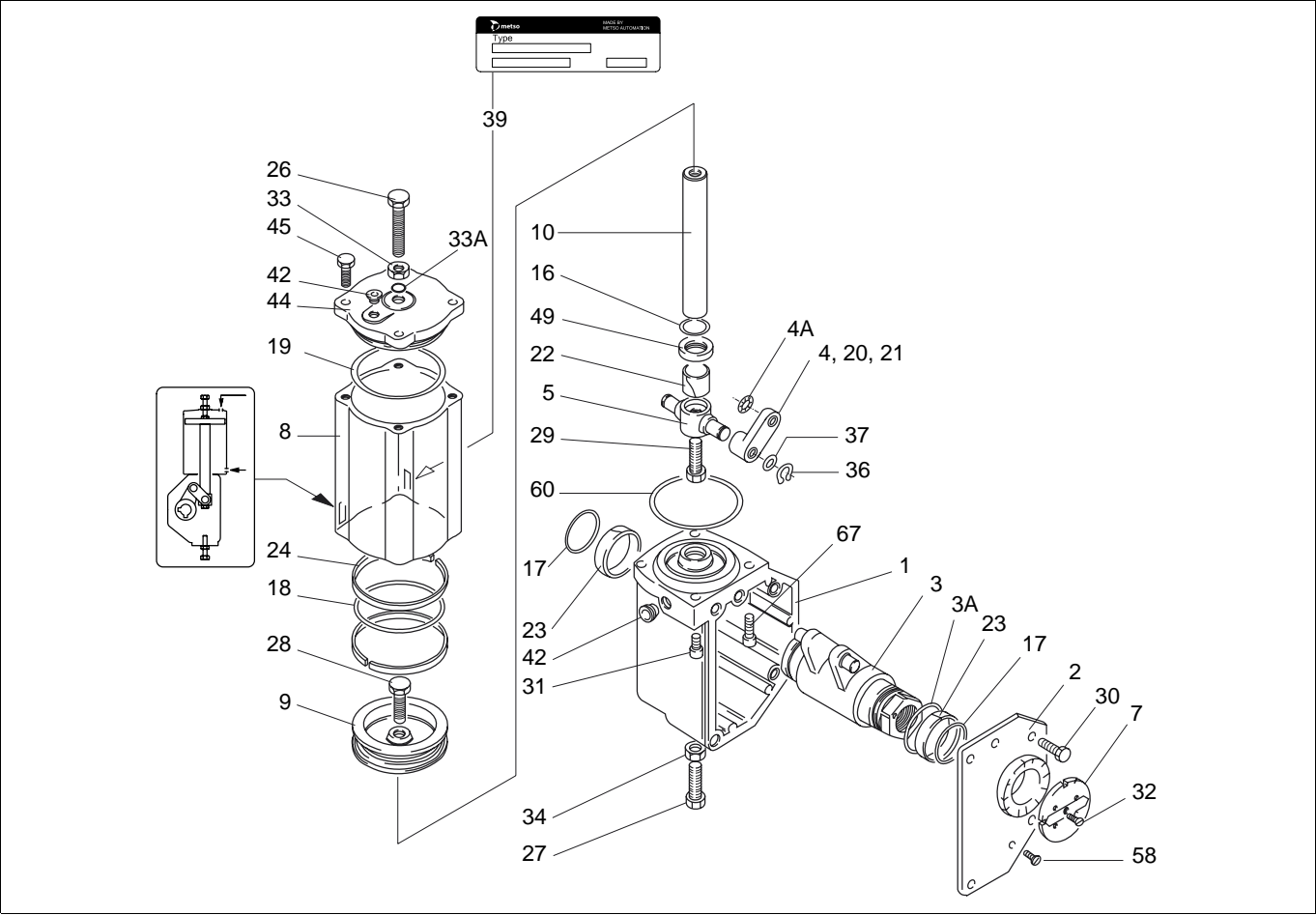
When ordering spare parts, always include the following information:

- ☐ type code, sales order number, serial number
- ☐ number of the parts list, part number, name of the part and quantity required

This information can be found from the identification plate or documents.

8 EXPLODED VIEWS AND PARTS LISTS

8.1 Actuators B1C 6



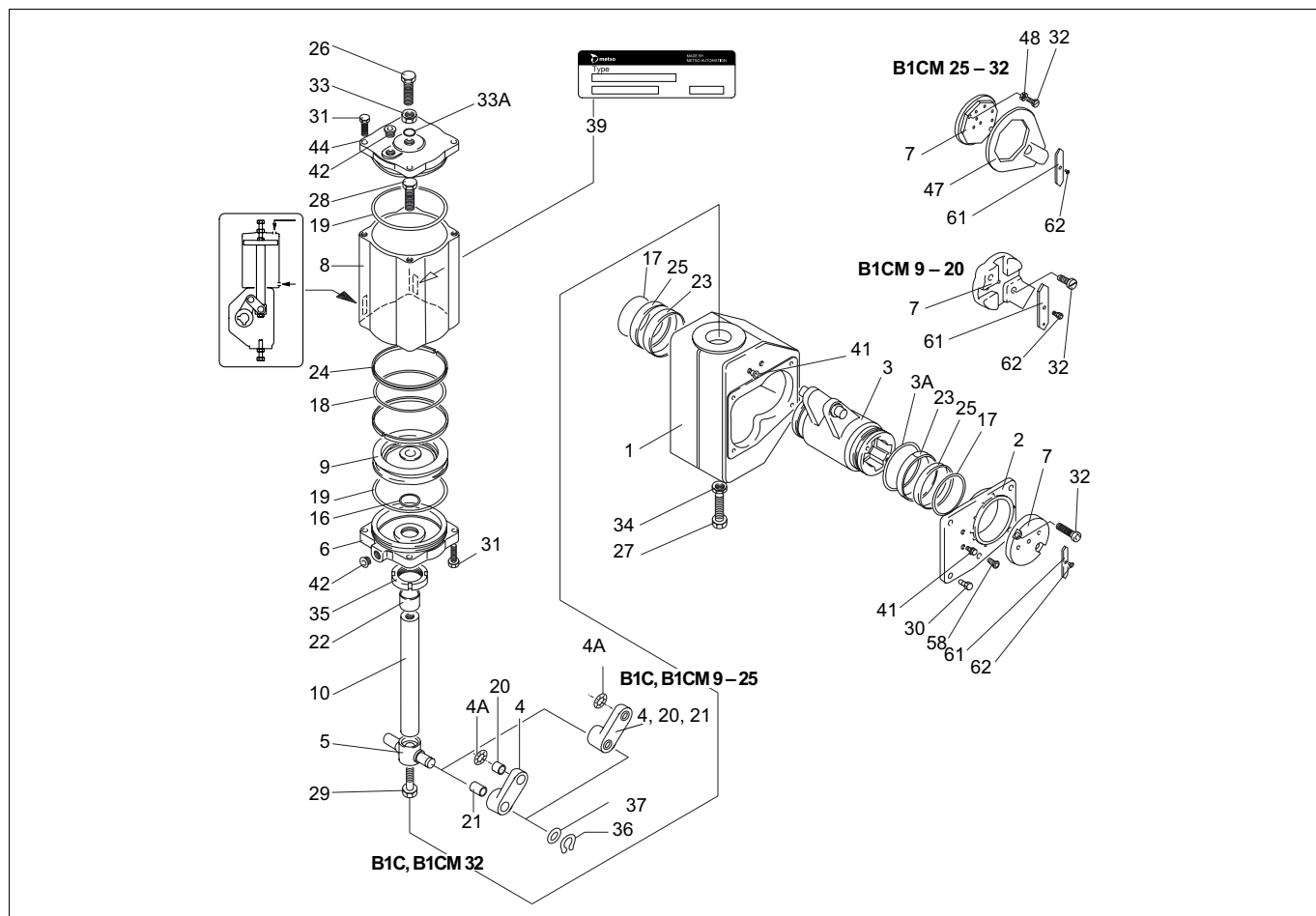
Item	Qty	Description	Spare part category	Item	Qty	Description	Spare part category
1	1	Housing		28	1	Screw	
2	1	Cover	3	29	1	Screw	
3	1	Lever arm	2 **	30	1	Screw	
3A	1	Antistatic ring	2 **	31	3	Screw	
4	2	Connection arm	2 **	32	2	Screw	
4A ***	1	Antistatic ring	2 **	33	1	Nut	3
5	1	Bearing unit	2 **	33A	1	O-ring	3
7	1	Pointer cover	3	34	1	Nut	3
8	1	Cylinder	3	36	2	Lock ring	(**)
9	1	Piston	3	37	2	Support ring	(**)
10	1	Piston rod	3	39	1	ID plate	
16	1	O-ring	1 *	42	2	Plug	
17	2	O-ring	1 *	44	1	Cylinder end	3
18	1	O-ring	1 *	45	4	Screw	
19	1	O-ring	1 *	49	1	Bushing	
20	2	Bearing	2 **	58	1	Pressure outlet valve	
21	2	Bearing	2 **	60	1	O-ring	
22	1	Bearing	1 *	62	1	Screw	
23	2	Bearing	1 *	67	1	Screw	
24	2	Piston seal	1 *	*) Delivered as a set) Leverage assembly, also available as separate part. Parts 20 and 21 are not available separately. They are delivered with part 4 as a set only. (**) Belongs to leverage assembly, not recommended as separate part (***) With long-run option			
26	1	Stop screw	3				
27	1	Stop screw	3				

Spare part category 1: Recommended soft parts for basic maintenance

Spare part category 2: Leverage repair

Spare part category 3: Complete overhaul (for complete overhaul parts of all 3 categories are needed)

8.2 Actuators B1C 9-32



Item	Qty	Description	Spare part category	Item	Qty	Description	Spare part category
1	1	Housing		28	1	Screw	
2	1	Cover		29	1	Screw	
3	1	Lever arm	2 **	30	4	Screw	
3A	1	Antistatic ring	2 **	31	8, 12	Screw	
4	2	Connection arm	2 **	32	2	Screw	
4A ***	1	Antistatic ring	2 **	33	1	Nut	3
5	1	Bearing unit	2	33A	1	O-ring	3
6	1	Cylinder base	3	34	1	Nut	3
7	1	Pointer cover	3	35	1	Lock nut	3
8	1	Cylinder	3	36	2	Lock ring	(**)
9	1	Piston	3	37	2	Support ring	(**)
10	1	Piston rod	3	39	1	ID plate	
16	1	O-ring	1 *	41		Plug	
17	2	O-ring	1 *	42		Plug	
18	1	O-ring	1 *	44	1	Cylinder end	3
19	2	O-ring	1 *	47	1	Torsion arm	
20	2	Bearing	2 ** (size 32: 1 *)	48	2	Washer	
21	2	Bearing	2 ** (size 32: 1 *)	58	1	Pressure outlet valve	
22	1, 2	Bearing	1 *	61	1	Direction arrow	3
23	2	Bearing	1 *	62	1	Screw	
24	2, 3	Piston seal	1 *				
25	2	Bushing	3				
26	1	Stop screw	3				
27	1	Stop screw	3				

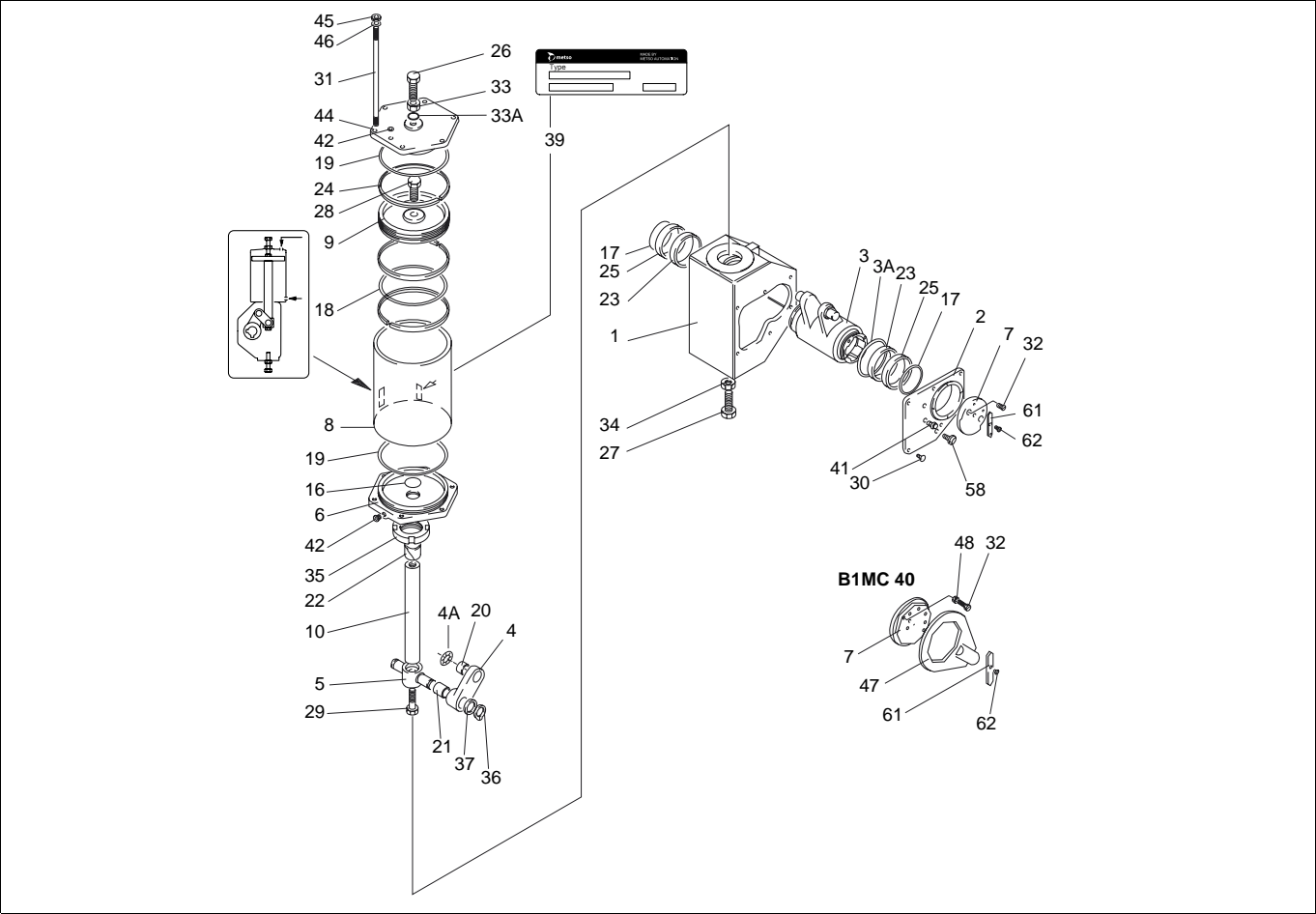
*) Delivered as a set
 **) Leverage assembly, also available as separate part.
 Actuator sizes 9-25: Parts 20 and 21 are not available separately.
 They are delivered with part 4 as a set only.
 (***) Belongs to leverage assembly, not recommended as separate part
 **) With long-run option and standard construction size 32

Spare part category 1: Recommended soft parts for basic maintenance

Spare part category 2: Leverage repair

Spare part category 3: Complete overhaul (for complete overhaul parts of all 3 categories are needed)

8.3 Actuators B1C 40-75



Item	Qty	Description	Spare part category	Item	Qty	Description	Spare part category
1	1	Housing		28	1	Screw	
2	1	Cover	3	29	1	Screw	
3	1	Lever arm	2 **	30	6	Screw	
3A	1	Antistatic ring	2 **	31	6	Stud	
4	2	Connection arm	2 **	32	2	Screw	
4A	1	Antistatic ring	2 **	33	1	Nut	3
5	1	Bearing unit	2 **	33A	1	O-ring	3
6	1	Cylinder base	3	34	1	Nut	3
7	1	Pointer cover	3	35	1	Lock nut	3
8	1	Cylinder	3	36	2	Lock ring	(**)
9	1	Piston	3	37	2	Support ring	(**)
10	1	Piston rod	3	39	1	ID plate	
16	1	O-ring	1 *	41		Plug	
17	2	O-ring	1 *	42		Plug	
18	1	O-ring	1 *	44	1	Cylinder end	3
19	2	O-ring	1 *	45	6	Nut	
20	2	Bearing	1 *	46	6	Washer	
21	2	Bearing	1 *	47	1	Torsion arm	
22	2	Bearing	1 *	48	2	Washer	
23	2	Bearing	1 *	58	1	Pressure outlet valve	
24	3, 4	Piston seal	1 *	61	1	Direction arrow	3
25	2	Bushing	3	62	1	Screw	
26	1	Stop screw	3				
27	1	Stop screw	3				

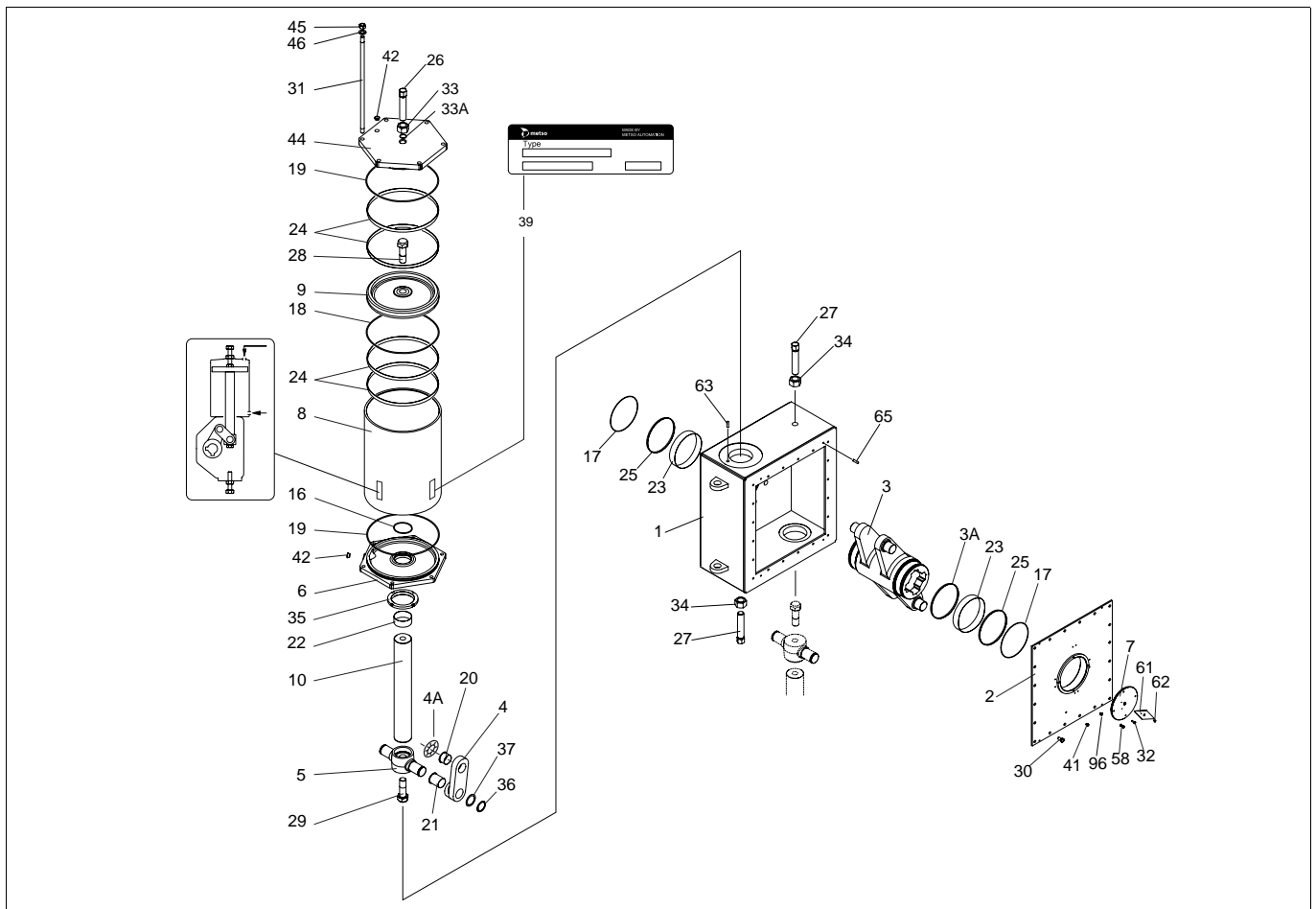
*) Delivered as a set
 **) Leverage assembly, also available as separate part
 (***) Belongs to leverage assembly, not recommended as separate part

Spare part category 1: Recommended soft parts for basic maintenance

Spare part category 2: Leverage repair

Spare part category 3: Complete overhaul (for complete overhaul parts of all 3 categories are needed)

8.4 Actuators B1C 502-752



Item	Qty	Description	Spare part category	Item	Qty	Description	Spare part category
1	1	Housing		28	2	Screw	
2	1	Cover	3	29	2	Screw	
3	1	Lever arm	2 **	30	20	Screw	
3A	1	Antistatic ring	2 **	31	12	Stud	
4	4	Connection arm	2 **	32	2	Screw	
4A	1	Antistatic ring	2 **	33	2	Nut	3
5	2	Bearing unit	2 **	33A	2	O-ring	3
6	2	Cylinder base	3	34	2	Nut	3
7	1	Pointer cover	3	35	2	Lock nut	3
8	2	Cylinder	3	36	4	Lock ring	(**)
9	2	Piston	3	37	4	Support ring	(**)
10	2	Piston rod	3	39	1	ID plate	
16	2	O-ring	1 *	41	4	Plug	
17	2	O-ring	1 *	42	4	Plug	
18	2	O-ring	1 *	44	2	Cylinder end	3
19	4	O-ring	1 *	45	12	Nut	
20	4	Bearing	1 *	46	12	Washer	
21	4	Bearing	1 *	58	1	Pressure outlet valve	
22	4	Bearing	1 *	61	1	Direction arrow	
23	2	Bearing	1 *	62	2	Screw	3
24	8	Piston seal	1 *	63	2	Pin	
25	2	Bushing	3	65	4	Pin	
26	2	Stop screw	3	96	4	Screw	
27	2	Stop screw	3				

*) Delivered as a set
 **) Leverage assembly, also available as separate part
 (***) Belongs to leverage assembly, not recommended as separate part

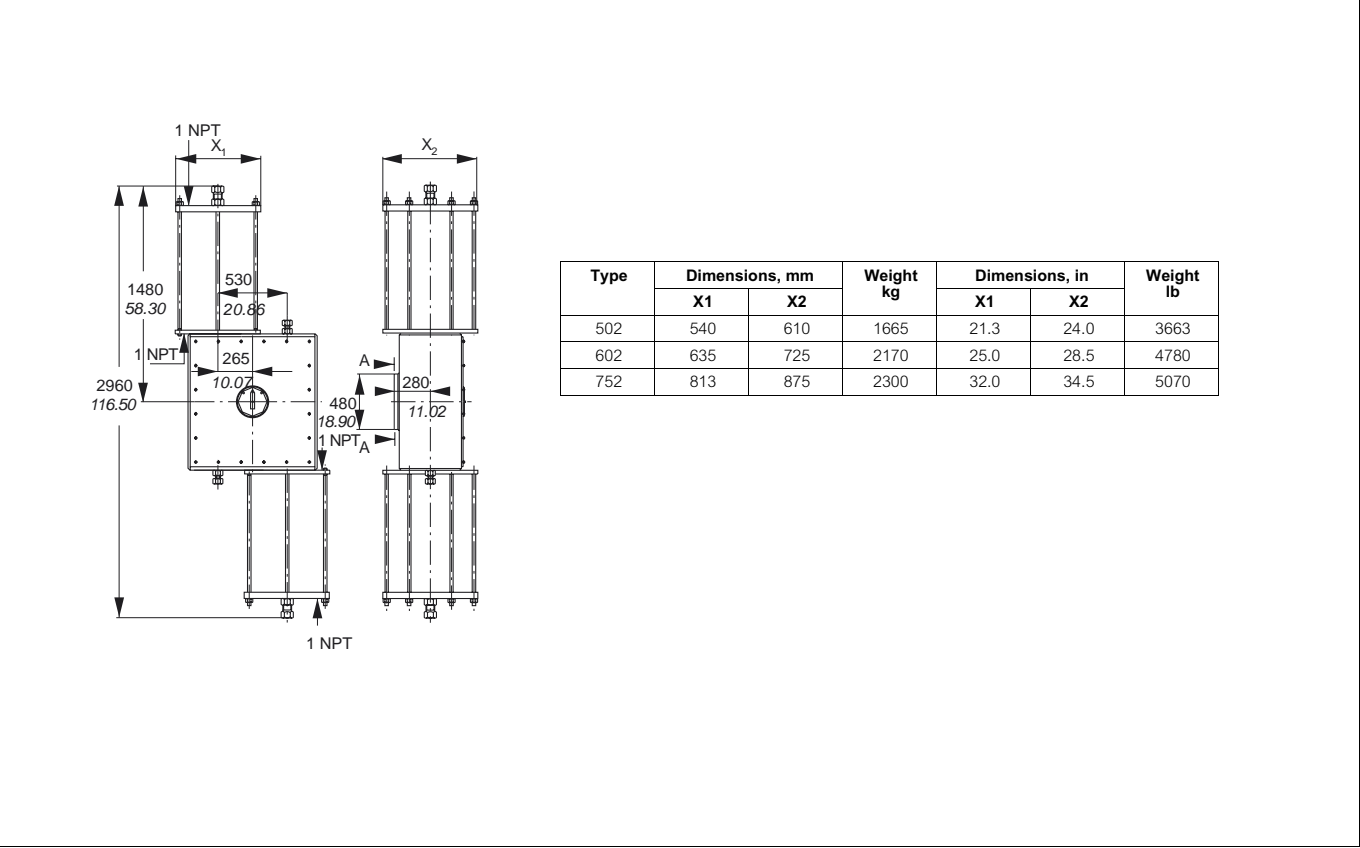
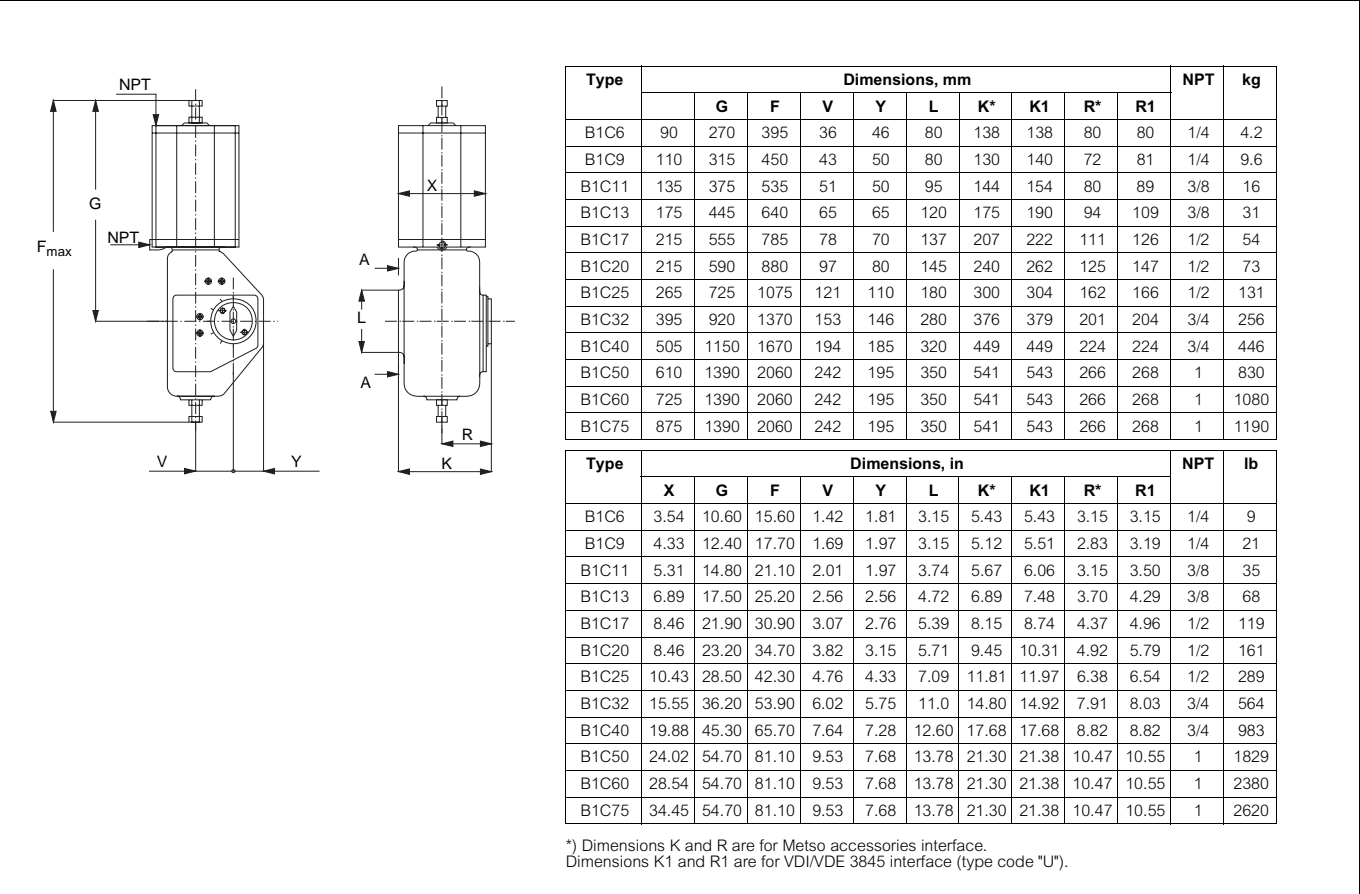
Spare part category 1: Recommended soft parts for basic maintenance

Spare part category 2: Leverage repair

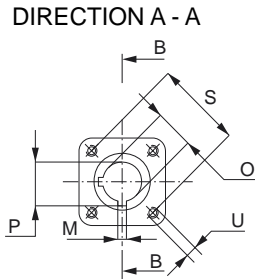
Spare part category 3: Complete overhaul (for complete overhaul parts of all 3 categories are needed)

9 DIMENSIONS AND WEIGHTS

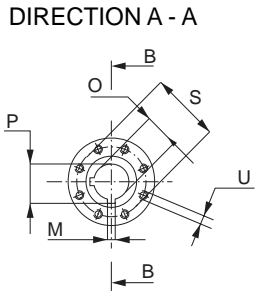
9.1 Actuator B1C



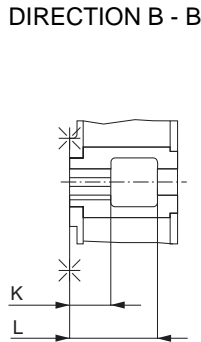
9.2 Attachment dimensions



B1C6...25



B1C32...752



B1C	Dimensions, mm								Mounting face
	O (H8)	M	P	K (keyway)	L	S	U	N	
6	15 20 25	4.76 4.76 6.35	17.0 23.3 27.9	40	90	70	M8	4	F07
9	15 20 25 35	4.76 4.76 6.35 9.52	17.0 23.3 27.9 39.3	50	90	70	M8	4	F07
11	20 25 35 40	4.76 6.35 9.52 9.52	23.3 27.9 39.3 44.4	60	105	102	M10	4	F10
13	55	12.70	60.8	75	130	125	M12	4	F12
17	55	12.70	60.8	80	120	140	M16	4	F14
20	70	19.05	78.3	105	195	140	M16	4	F14
25	95	22.22	105.5	140	235	165	M20	4	F16
32	105	25.40	116.3	155	280	254	M16	8	F25
40	95 105 120	22.22 25.40 31.75	105.5 116.3 133.9	180	340	298	M20	8	F30
50 60 75	120 135	31.75 31.75	133.9 149.2	200	430	356	M30	8	F35
502 602 752	120 135 150 165 180	31.75 31.75 31.75 38.10 44.45	133.9 149.2 166.8 182.0 199.4	250	470	406	M36	8	F40

B1C	Dimensions, in								Mounting face
	O (H8)	M	P	K (keyway)	L	S	U	N	
6	0.59 0.79 0.98	0.19 0.19 0.25	0.67 0.92 1.10	1.57	3.54	2.76	M8	4	F07
9	0.59 0.79 0.98 1.38	0.19 0.19 0.25 0.37	0.67 0.92 1.10 1.55	1.97	3.54	2.76	M8	4	F07
11	0.79 0.98 1.38 1.57	0.19 0.25 0.37 0.37	0.92 1.10 1.55 1.75	2.36	4.13	4.02	M10	4	F10
13	2.17	0.50	2.39	2.95	5.12	4.92	M12	4	F12
17	2.17	0.50	2.39	3.15	4.72	5.51	M16	4	F14
20	2.76	0.75	3.08	4.13	7.68	5.51	M16	4	F14
25	3.74	0.87	4.15	5.51	9.25	6.50	M20	4	F16
32	4.13	1.00	4.58	6.10	11.02	10.00	M16	8	F25
40	3.74 4.13 4.72	0.87 1.00 1.25	4.15 4.58 5.27	7.09	13.39	11.73	M20	8	F30
50 60 75	4.72 5.31	1.25 1.25	5.27 5.87	7.87	16.93	14.02	M30	8	F35
502 602 752	4.72 5.31 5.91 6.50 7.09	1.25 1.25 1.25 1.50 1.75	5.27 5.87 6.57 7.17 7.85	9.84	18.50	15.98	M36	8	F40

10 TYPE CODE

Pneumatic double-acting cylinder actuator, B1C

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
B1	C	-	S	Q	U	50/120	H	E	X

1.	Product group
B1	Cylinder actuator with attachment dimensions acc. to ISO 5211
B	Cylinder actuator with attachment dimensions acc. to internal standard
2.	Series
C	Double acting, pneumatic
3.	Construction
-	Standard construction without sign
H	Manual hydraulic override
4.	Cylinder and housing materials
-	Aluminium cylinder and GG-20 housing, standard materials, without sign
S	Steel cylinder and GG-20 housing
B	Alumium cylinder and GGG-40 housing
X	Steel cylinder and GGG-40 housing
5.	Special construction
-	Standard construction without sign
Q	Mechanical locking device for piston movement limit on housing end. Locking with long screw to close position.
W	Mechanical locking device for piston movement limit on cylinder end. Locking with long screw to open position.
QW	Mechanical locking device for piston movement limit on housing and cylinder ends. Locking with long screw to close as well as to open position.
G	Actuator equipped with automatic latching device and shock absorber on housing end
DD	Built-in manual locking device of actuator housing. Locking to close position. Maintenance locking device which keeps tightness of butterfly.
Z	Actuator equipped with shock absorber on cylinder end
N	Actuator equipped with shock absorber on housing end
P	Actuator equipped with automatic latching device for closed position. Design is made mainly for actuator locking device of capping valve. No free motion.
T	Actuator equipped with manual latching device. Actuator can be locked to open position allowing about 20 degrees' motion.
K	Handwheel on cylinder end (sizes 9 to 25).
L	Handwheel on housing end (sizes 9 to 25).
R	Handwheel both on cylinder end and housing end (sizes 9 to 25).
RK	Handwheel on cylinder end with wormgear (sizes 32 to 75). Not used in 502, 602 and 752.
RL	Handwheel on housing end with wormgear (sizes 32 to 75). Not used in 502, 602 and 752.
RR	Secondary handwheel with wormgear (sizes 32 to 75). Not used in 502, 602 and 752.
Y	Special

6.	Interface for additional devices
U	Interface according to VDI/VDE 3845, standard construction.
7.	Actuator size
-	E.g. 50/120 = actuator size / shaft bore diameter. Note special sizes (B1C 50 and 502 with oversized cylinder): 60 - max. supply pressure 8.5 bar 75 - max. supply pressure 5 bar 602 - max. supply pressure 8.5 bar 752 - max. supply pressure 5 bar
8.	Materials of seals and bearings
-	Standard construction without sign (-20° to +70 °C) O-rings: Nitrile rubber. Bearings and piston seals: PE-HDD DU-bearings in sizes 6 to 25 Stainless steel net + PTFE bearings with antistatic ring in sizes 32 to 752
H	High temperatures (-20° to +120 °C) Dynamic O-rings: Fluorocarbon rubber Bearings and piston seals: PTFE + C25
C	Low temperatures (-40° to +70 °C) Dynamic O-rings: Epichlorhydrin rubber Bearings and piston seals: PTFE + C25
F	Oversized NPT connections: fast operation
F1	Large oversized NPT connections: faster operation
L	Long-run option High cycle bearings: Fiberglide with antistatic ring Special piston rod seal: Double Delta; O-ring + PTFE
D	DU-bearings For sizes 32 to 502
9.	Screw material
-	Stainless steel (standard) without sign for sizes 6-32. Steel, zinc coated and passivated (standard) without sign for sizes 40 and bigger.
E	Stainless steel for sizes 40 and bigger
10.	Non-standard operation range
X	Valve closed position is limited. When closed position is limited to 30°, X = 30 (never fully closed).
Z	Valve open position is limited. When open position is limited to 70°, Z = 70 (never fully open).
XZ	Valve closed and open position are limited. X = 30 (closed position is limited to 30°) Z = 70 (open position is limited to 70°)

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